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Concept Selection Process

GIF Policy & Experts Meeting: London
February 18-19, 2002

Purpose of this Talk

- *Adopt major conclusions of the fuel cycle studies*
- *Explain the process, schedule and responsibilities*
- *Briefly review the evaluations available today*

The Discussion Session Tuesday Morning:

- *Discuss and agree on process items identified*

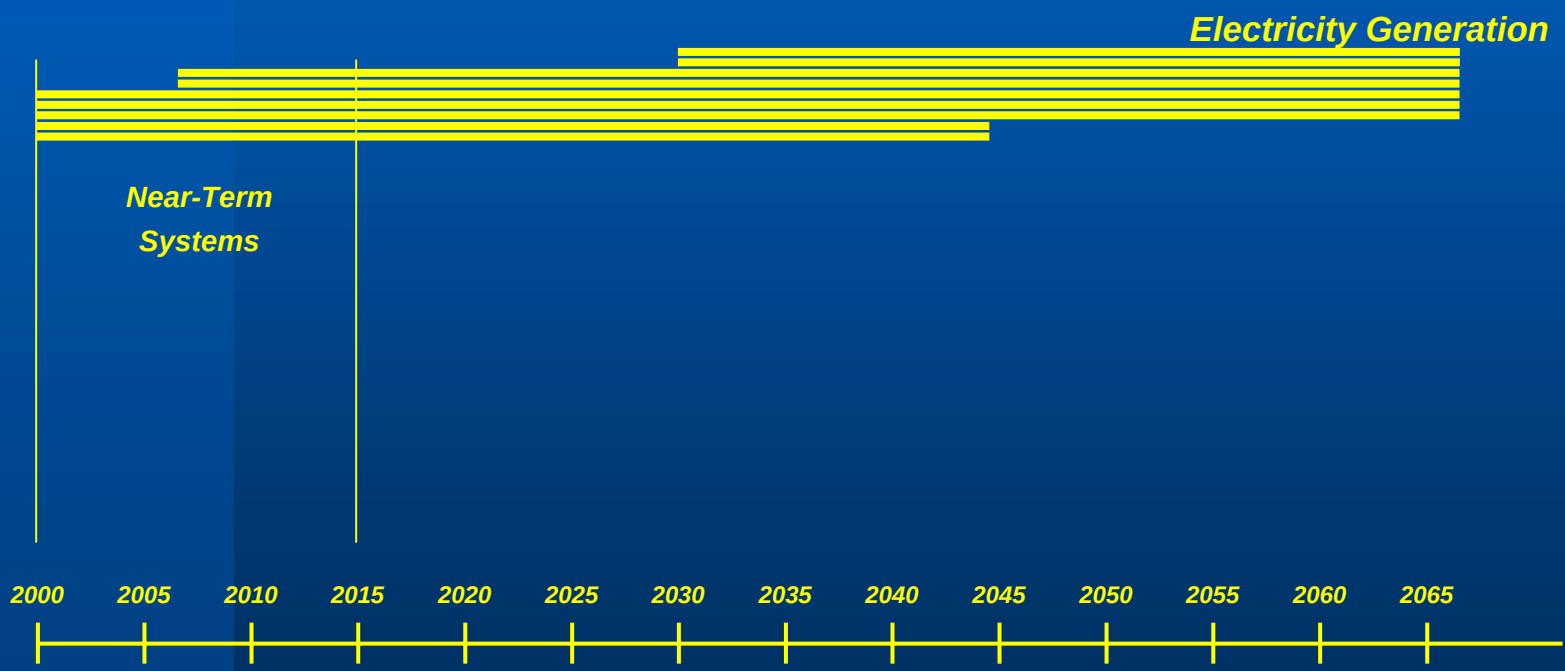
Progress Toward Selection

- *Initial Request for Concepts: over 100*
- *Screening for Potential: ~30 concept sets were organized and considered*
- *Final Screening (to date): 20 concept sets have been refined, and are being evaluated in considerable detail*

"How will we choose from the 20 evaluated concepts, to select the 6-8 recommended concepts for Gen IV ?"

What Systems are Needed?

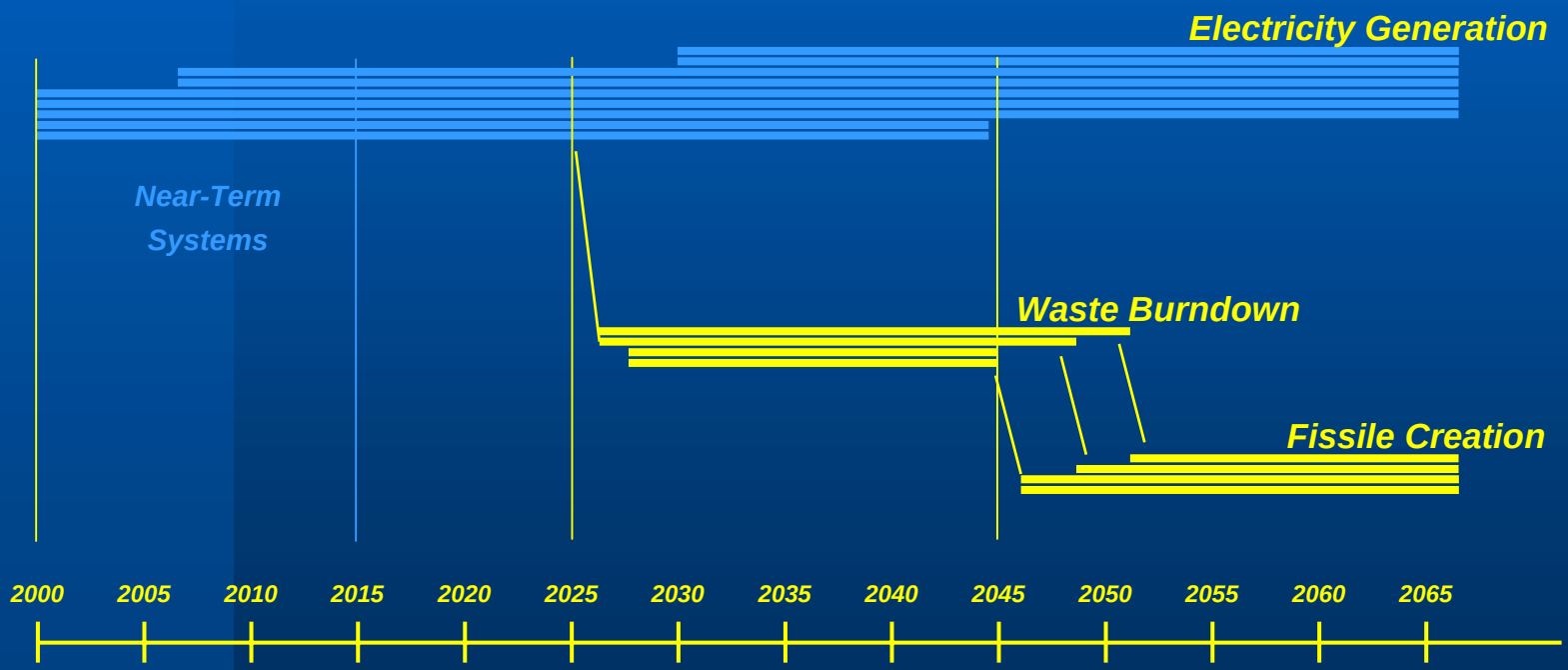
1: Electricity Generation, near and long-term



What Systems are Needed?

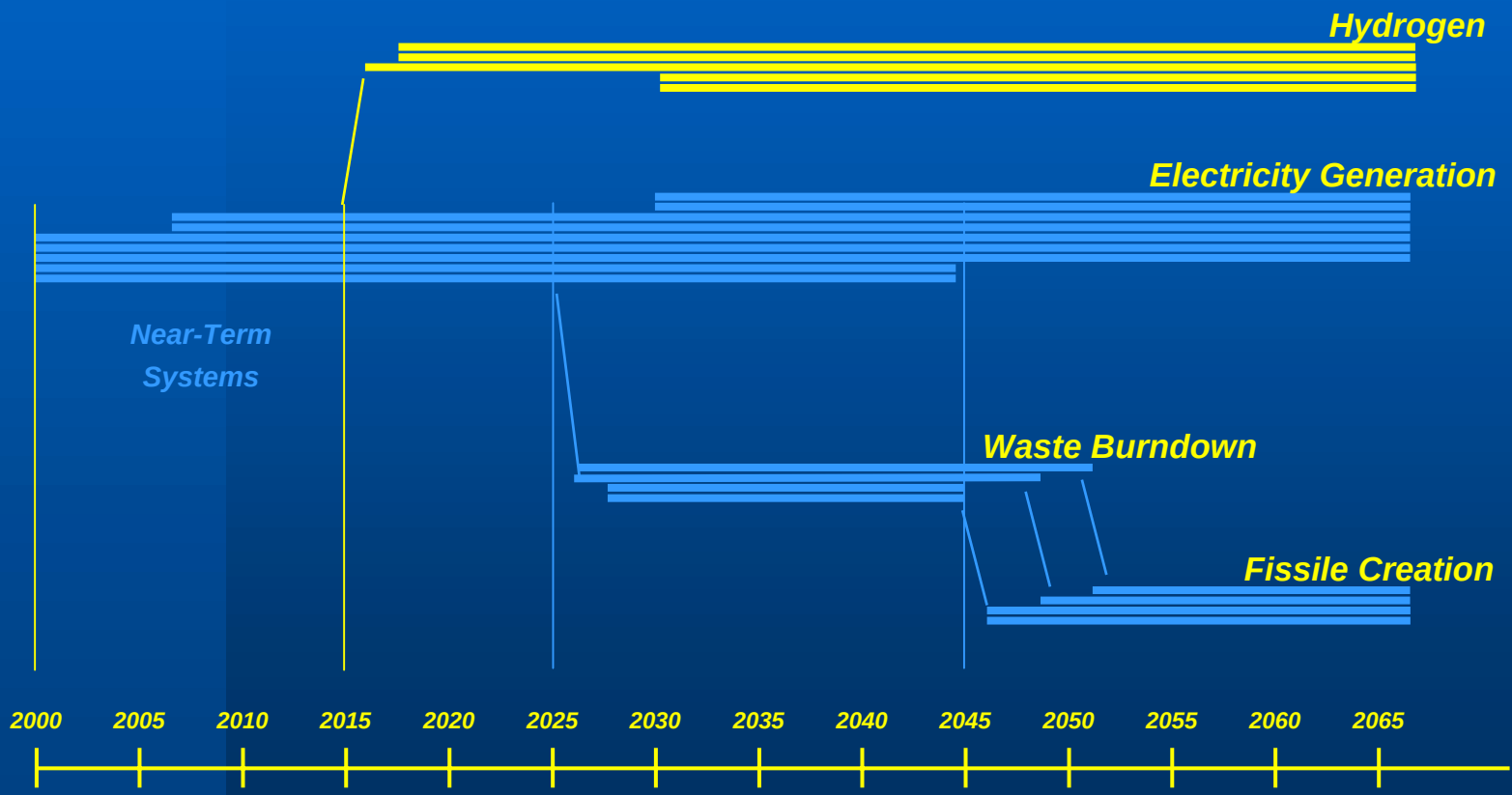
2: Waste Burning of spent fuel

3: Fissile Creation from conversion of fertile material

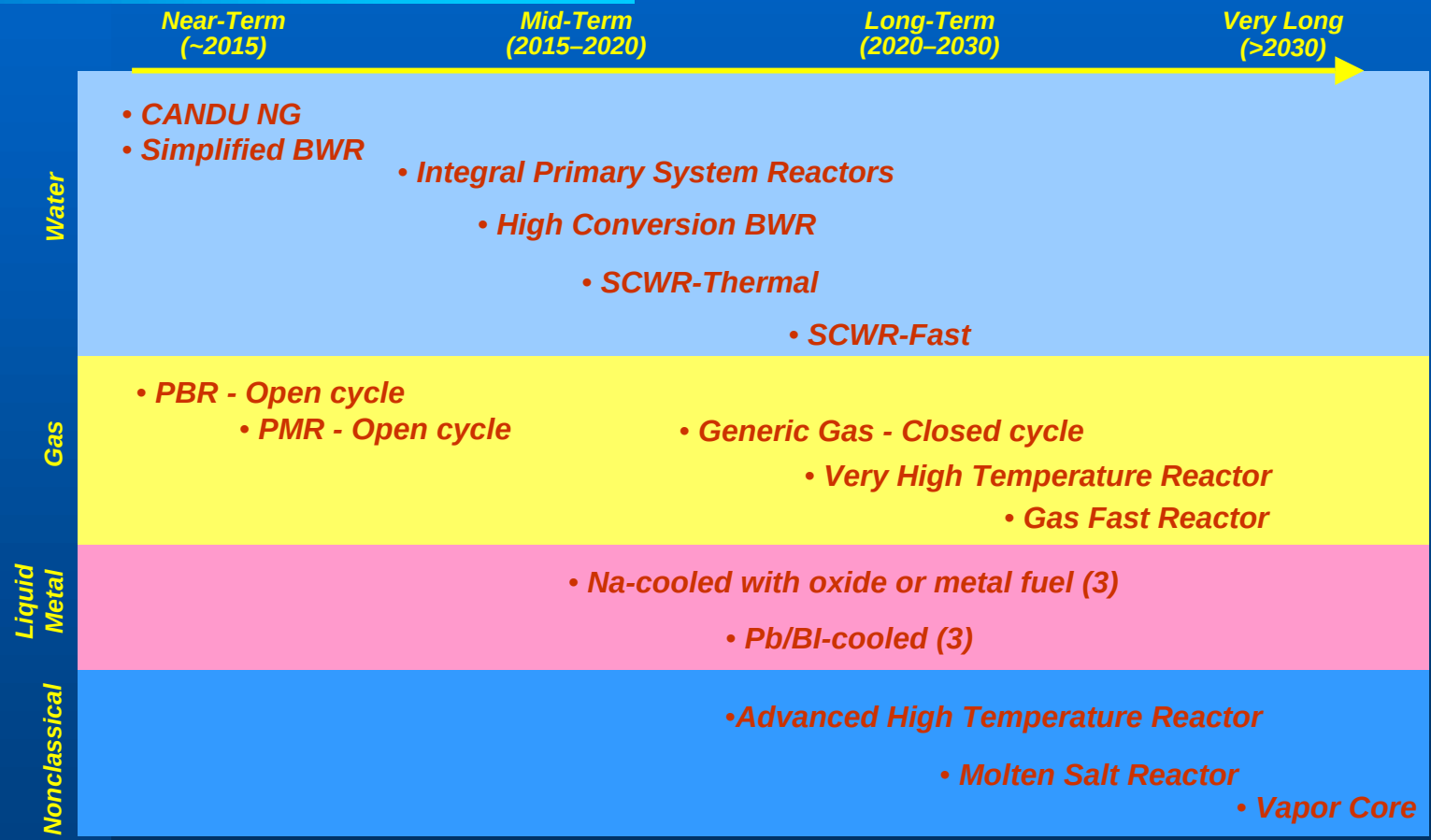


What Systems are Needed?

4: Hydrogen, or other products near and long-term



What Systems could be Available?



Missions are a Primary Consideration

"Missions for Generation IV are the Broad Elements of a Sustainable Future for Nuclear Energy"

Preliminary list of Missions:

- ***Electricity***
- ***Hydrogen (and perhaps other products)***
- ***Waste burndown***
- ***Fissile creation***

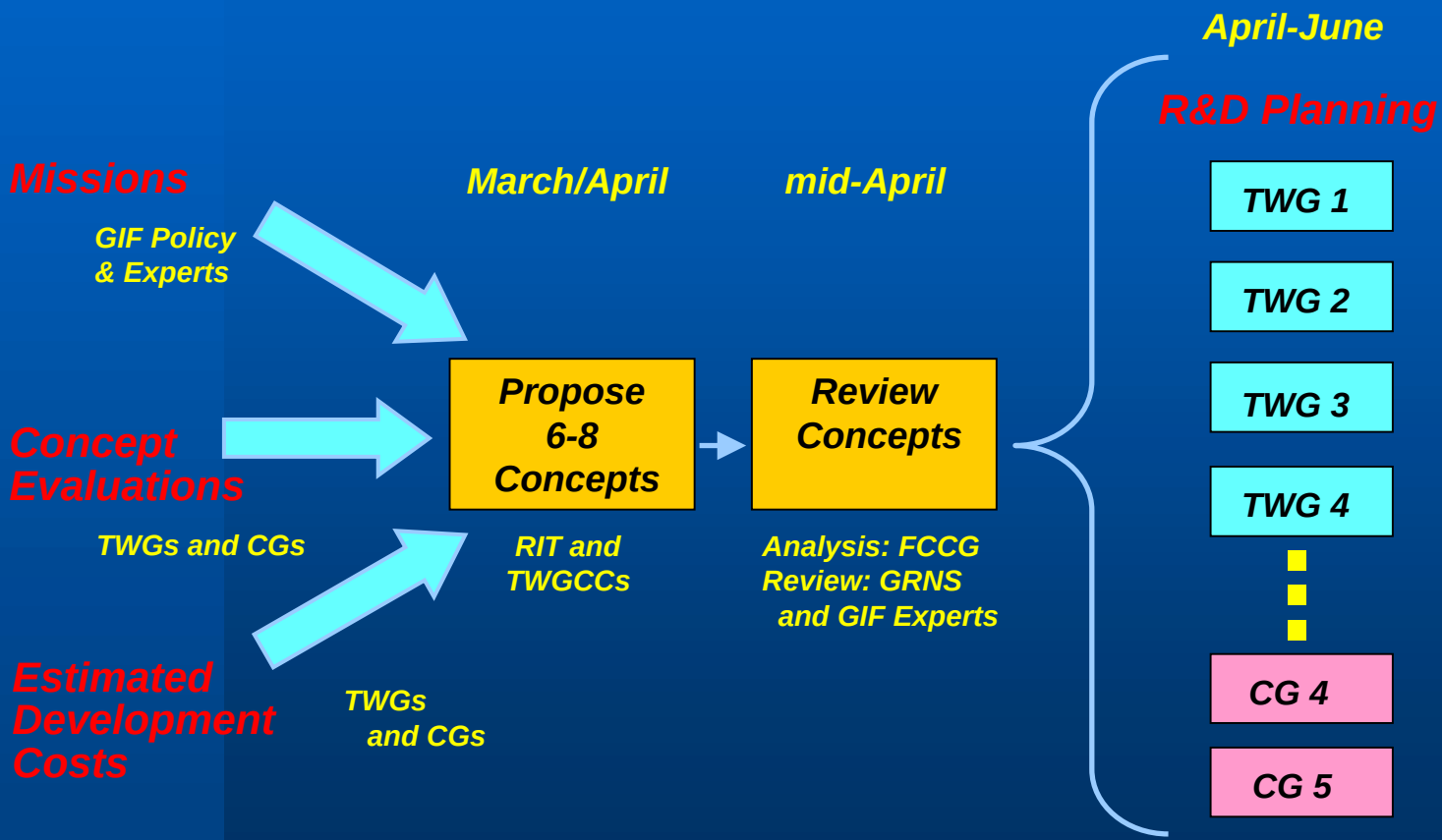
Not considered missions are:

- ***Market Niches, or***
- ***Regional Needs***

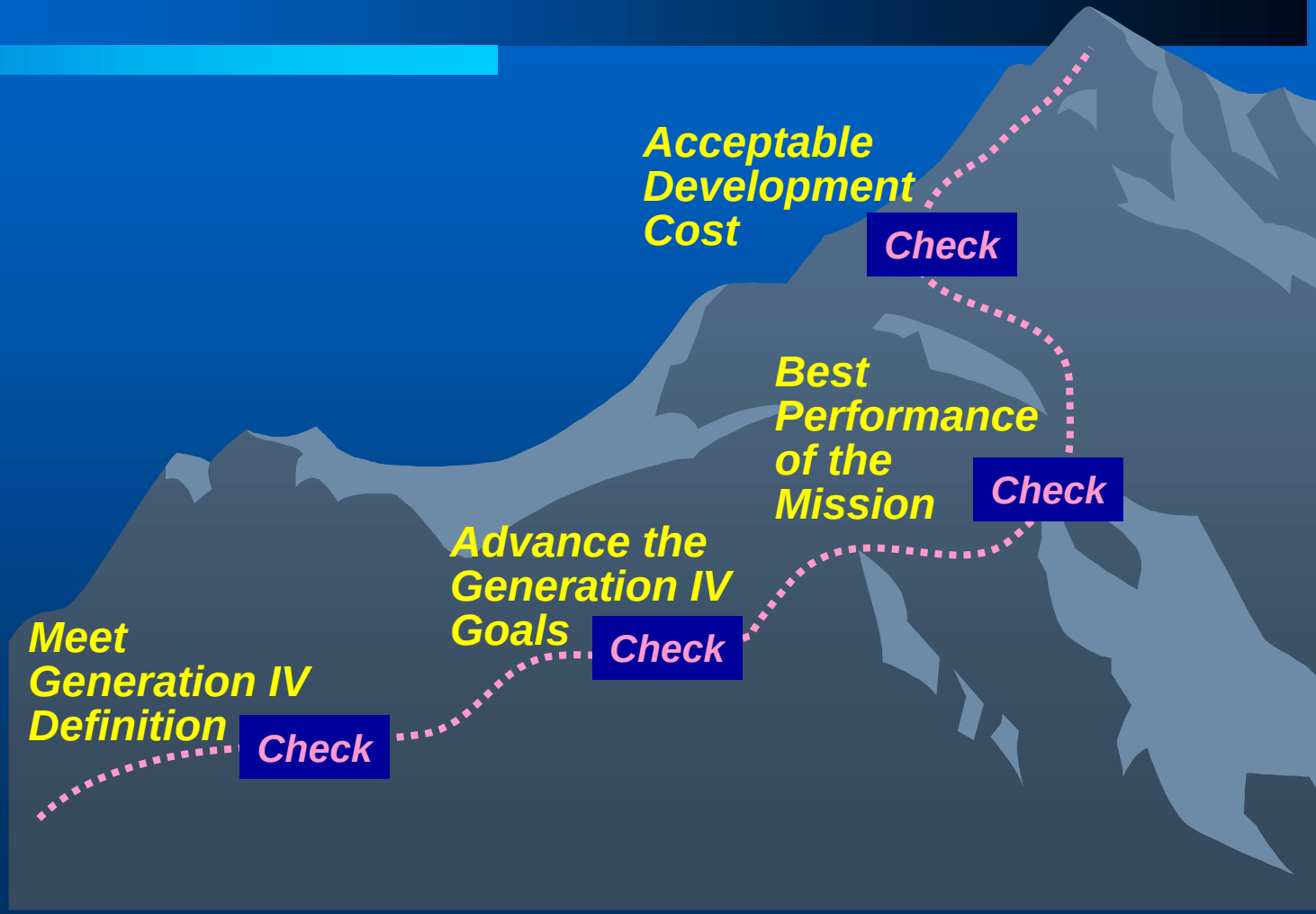
A Few Examples of Mission Relevance

Mission:	Water	Gas	Liquid Metal	Non-Classical
• Electricity	CANDU NG	PBR/PMR		
• Hydrogen		VHTR		AHTR
• Waste burndown	SCWR Fast	GFR	Na LMR; Pb/Bi	MSR
• Fissile creation			Na LMR	

Overall Concept Selection Process



Process for the Final Selection



Highlights of the Selection Process

- *The fuel cycle studies motivates several key missions that can considerably aid the selection process*
- *The missions for Generation IV are high-level guidance from the GIF members that will be discussed tomorrow.*
- *Draft selections are proposed to be discussed with the GIF Experts Group in Washington DC on April 12, and possibly at a later meeting in May/June after evaluations are done.*
- *The concept of Near-Term Systems arises naturally, and will also be discussed tomorrow.*

Review of the Evaluations to Date

1. Review the three Goal Areas
2. Review a few individual Goal Evaluations
3. Understand the limitation of an overall rollup

"We are focused on the process, and not on the selections, at this point."

Concept Identifiers

- *Water-cooled systems*
  - *W1 - Integral primary system reactors*
  - *W2 - Simplified BWR*
  - *W3 - CANDU NG*
  - *W4 - SCWR, thermal*
  - *W5 - SCWR, fast*
  - *W6 - High conversion BWR*

- *Gas-cooled systems*
  - *G1 - PBR open cycle*
  - *G2 - PMR open cycle*
  - *G3 - VHTR open cycle*
  - *G4 - Generic gas - closed cycle*
  - *G5 - Gas fast reactor*

- *Liquid-metal cooled systems*
  - *L1 - Na cooled, oxide fuel*
  - *L2 - Na cooled, metal fuel*
  - *L3 - Na cooled, metal fuel, Japan*
  - *L4 - Medium Pb/Pb-Bi cooled, US*
  - *L5 - Medium Pb/Pb-Bi cooled, Russia*
  - *L6 - Small Pb/Pb-Bi cooled*

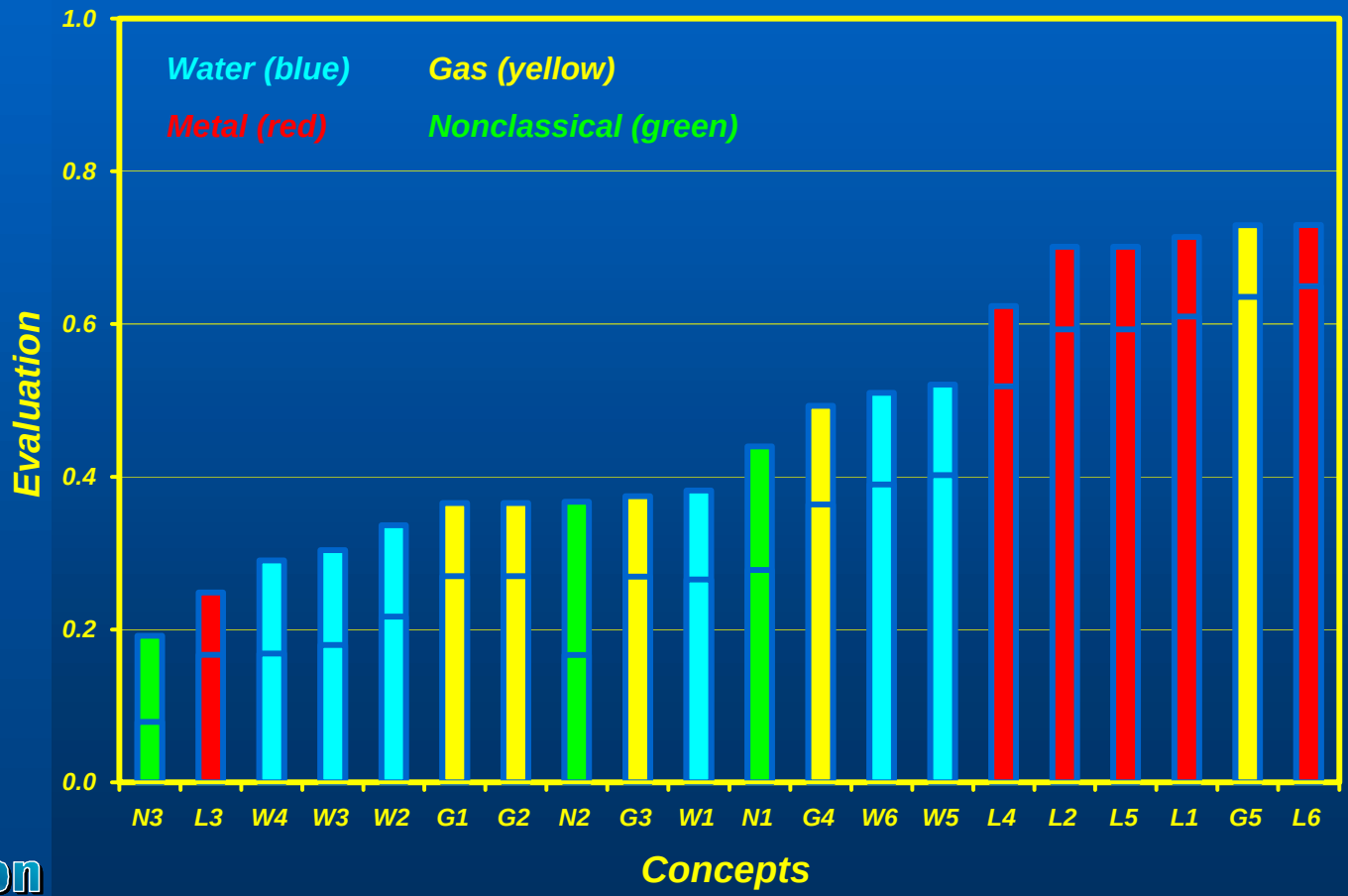
- *Non-classical systems*
  - *N1 - Molten salt core*
  - *N2 - Gas core*
  - *N3 - Molten salt cooled*

Key Assumptions and Highlights

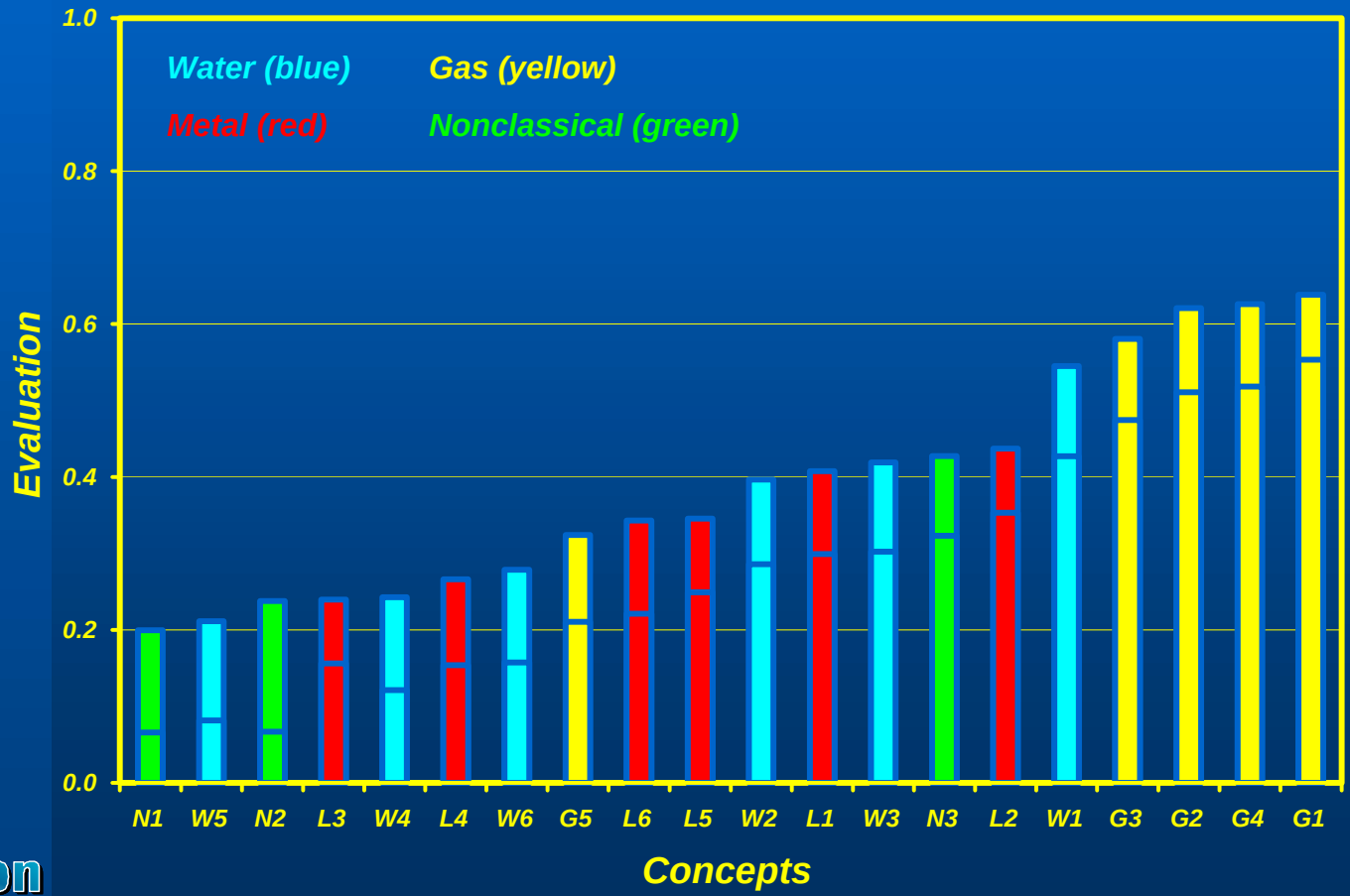
- *This summary based on Jan 25th TWG evaluations*
- *Evaluations based on v2 of the FSR*
- *20 concepts are evaluated*
- *TWGs and CGs are still actively working on the evaluations (until the end of April)*

"It is very important to remember that the evaluations are still preliminary."

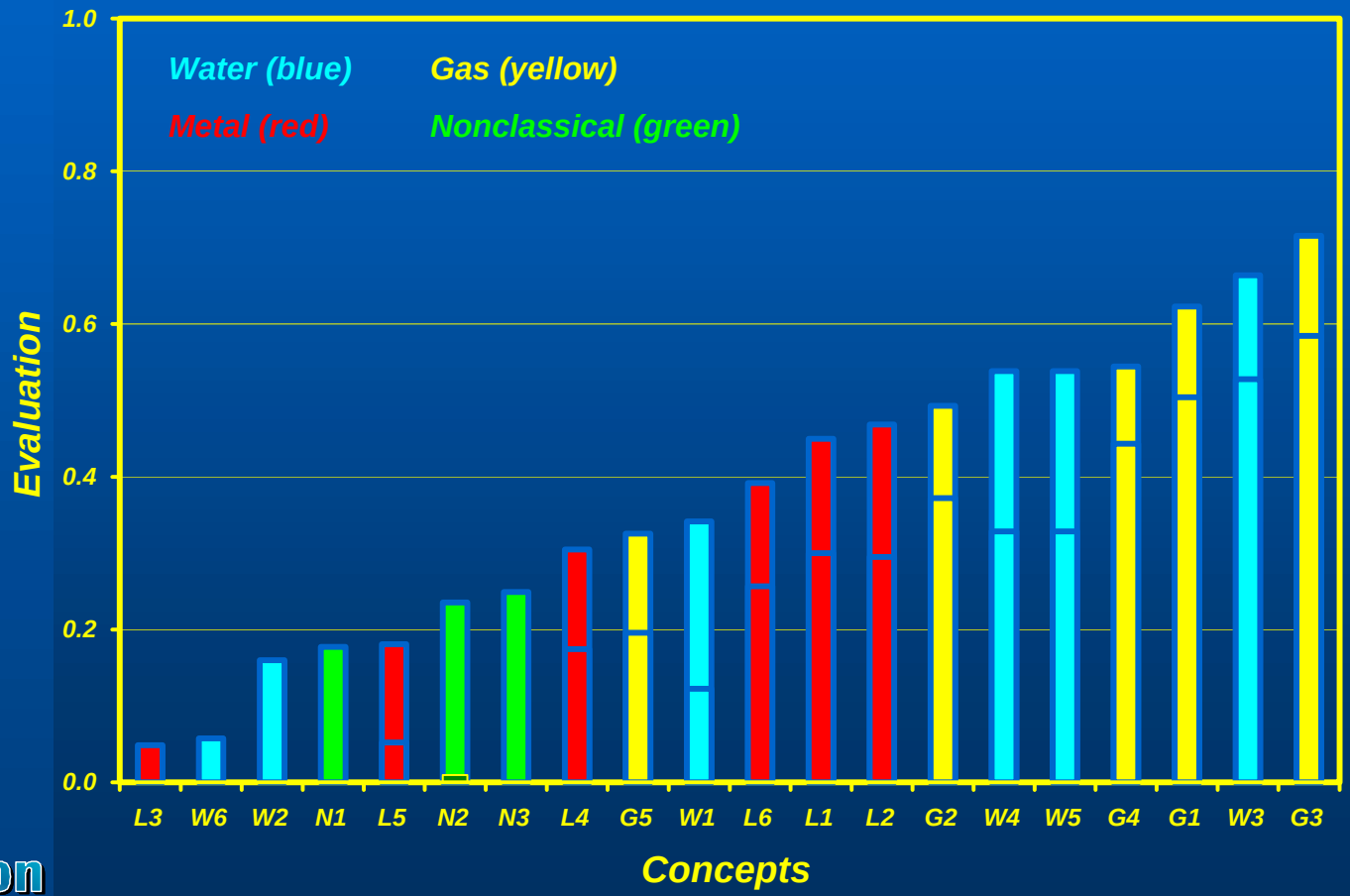
Preliminary Sustainability Evaluation



Preliminary Safety & Reliability Evaluation



Preliminary Economics Evaluation

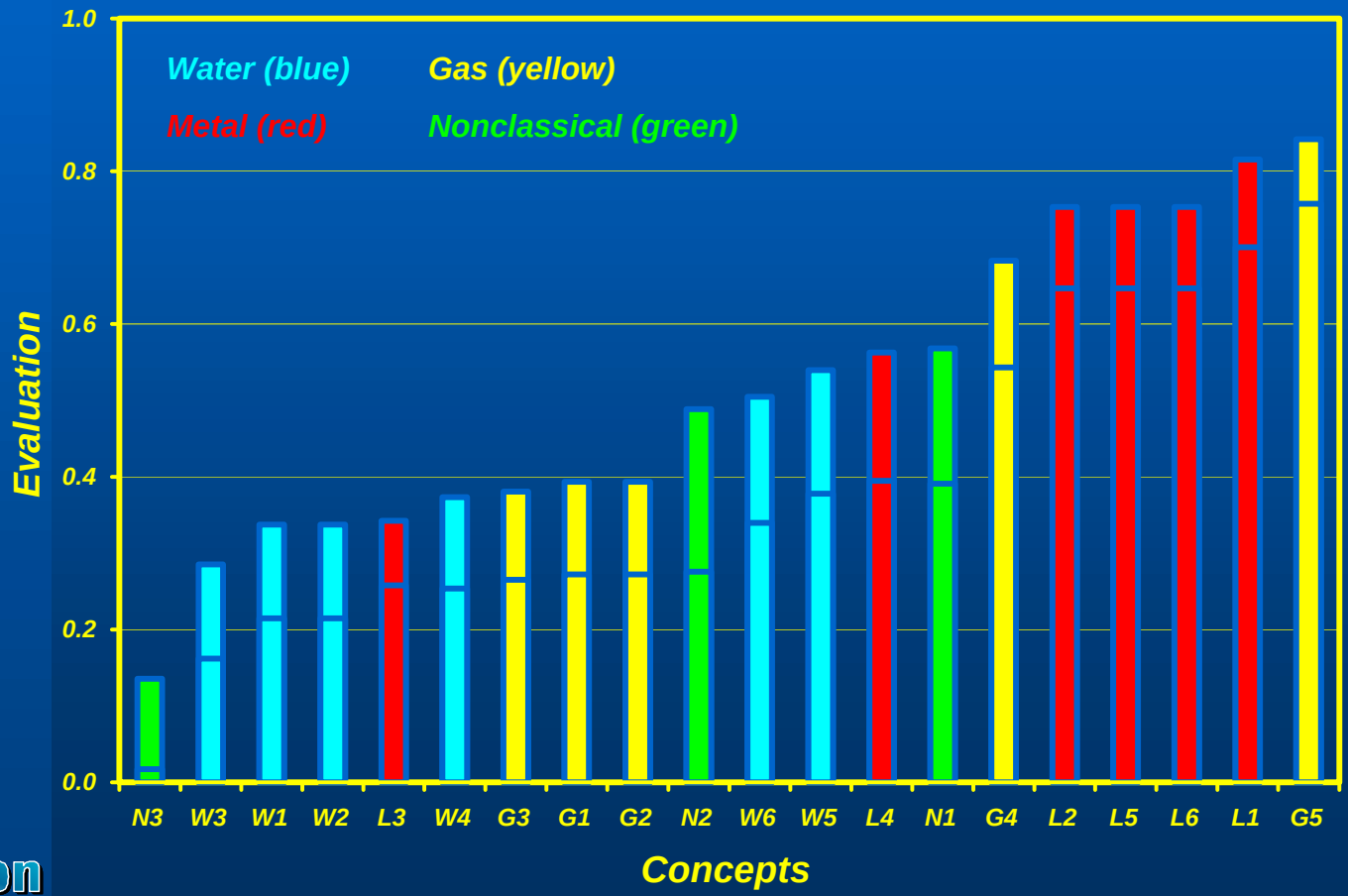


Conclusions on Goal Area Evaluations

- *Overall, the evaluations in sustainability seem generally consistent: fast reactors dominate the upper half of the field.*
- *Evaluations in safety and reliability and economics seem generally consistent, although a number of evaluations are undergoing further examination.*
- *Evaluations within each technical working group appear to produce consistent ordering of their concepts.*

SU-2 Evaluation

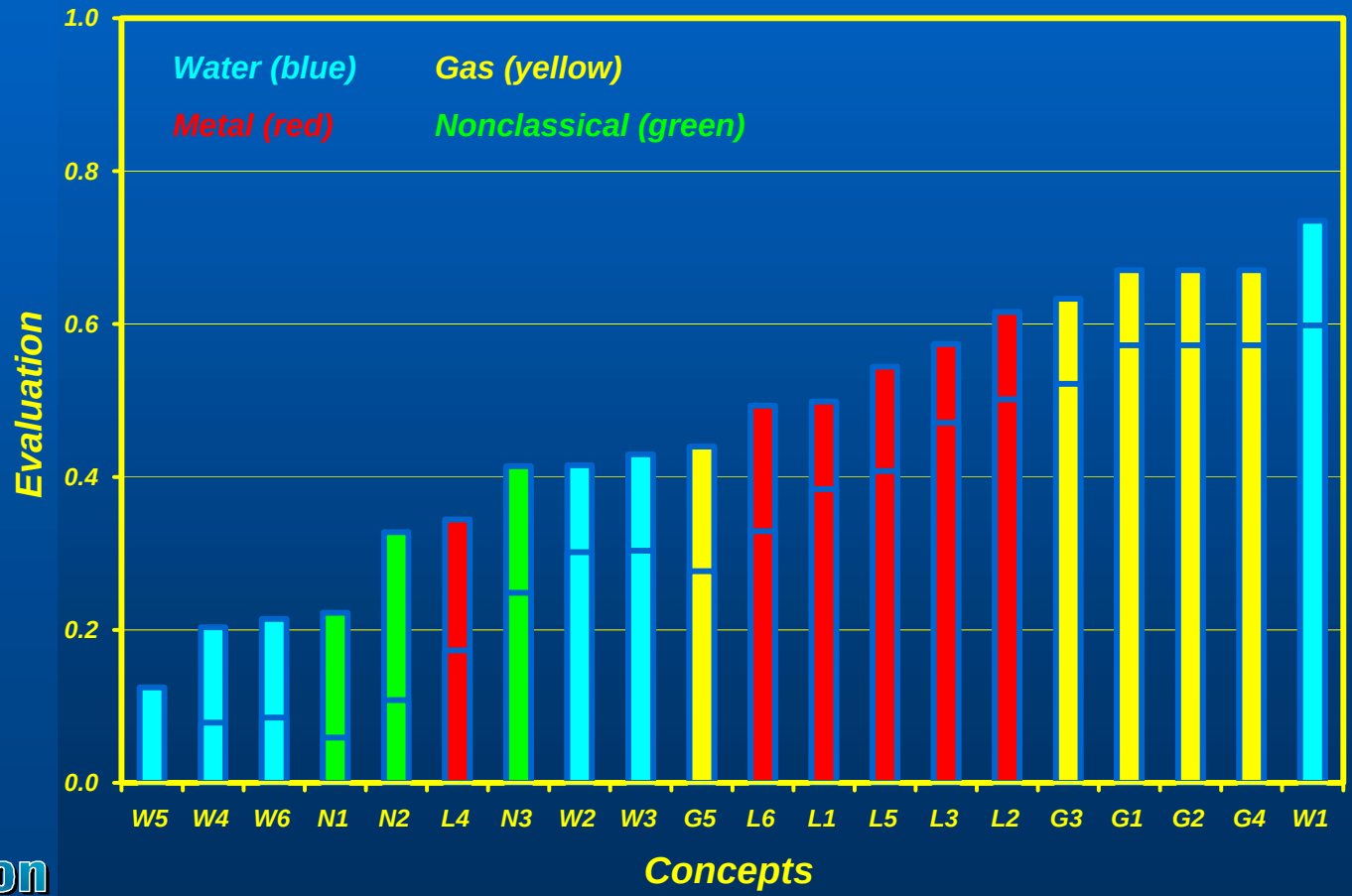
Waste Minimization and Management



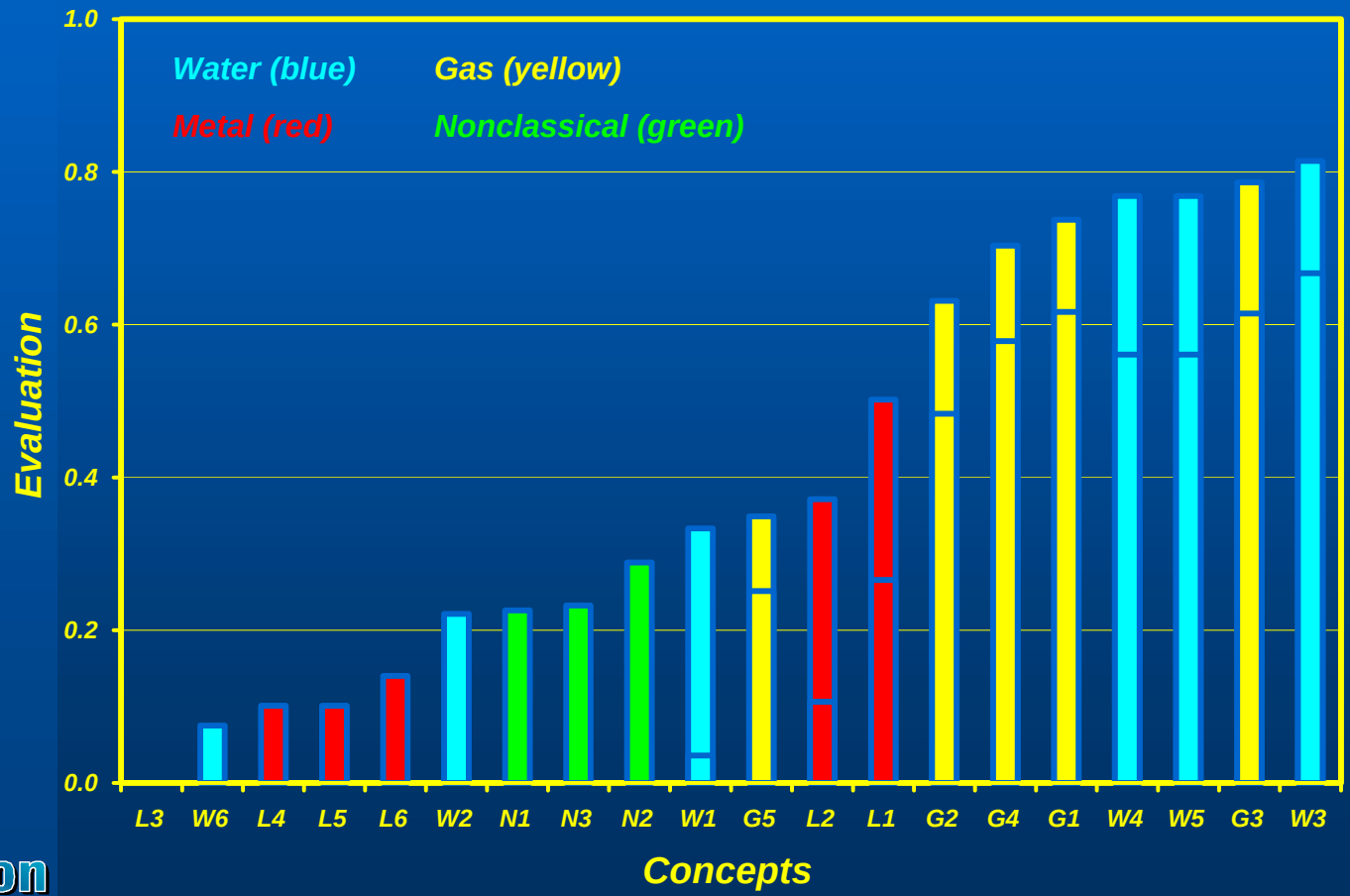
Generation IV

SR-2 Evaluation

Safety Features and Physical Model Characterization



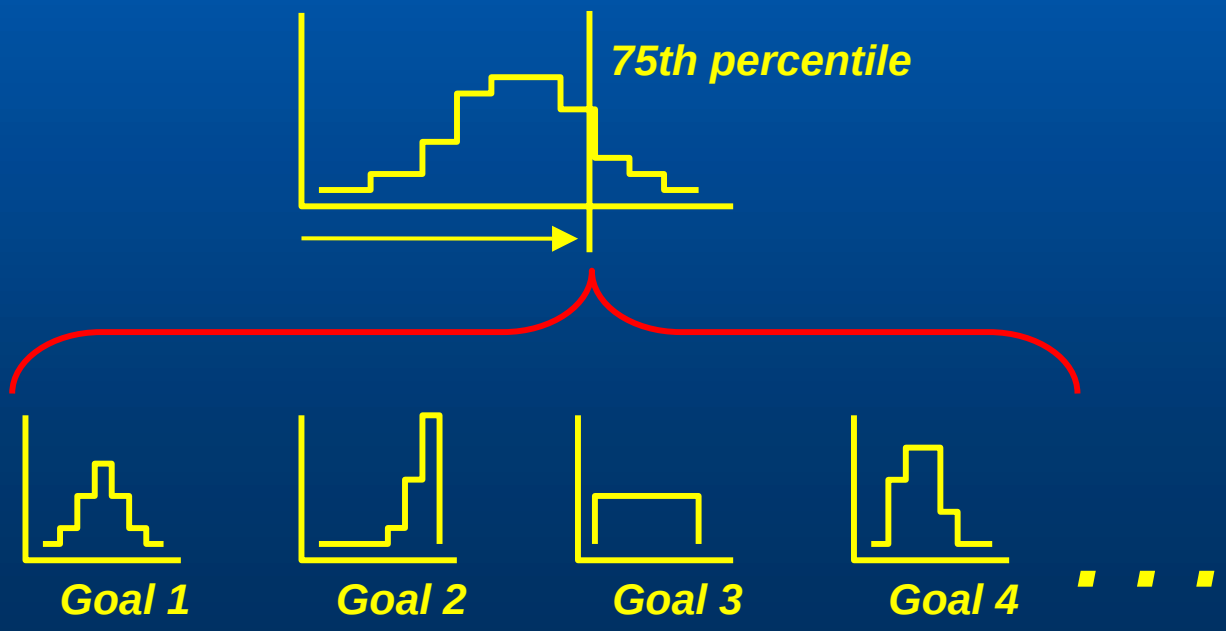
EC-1 Evaluation
Construction and Production Costs



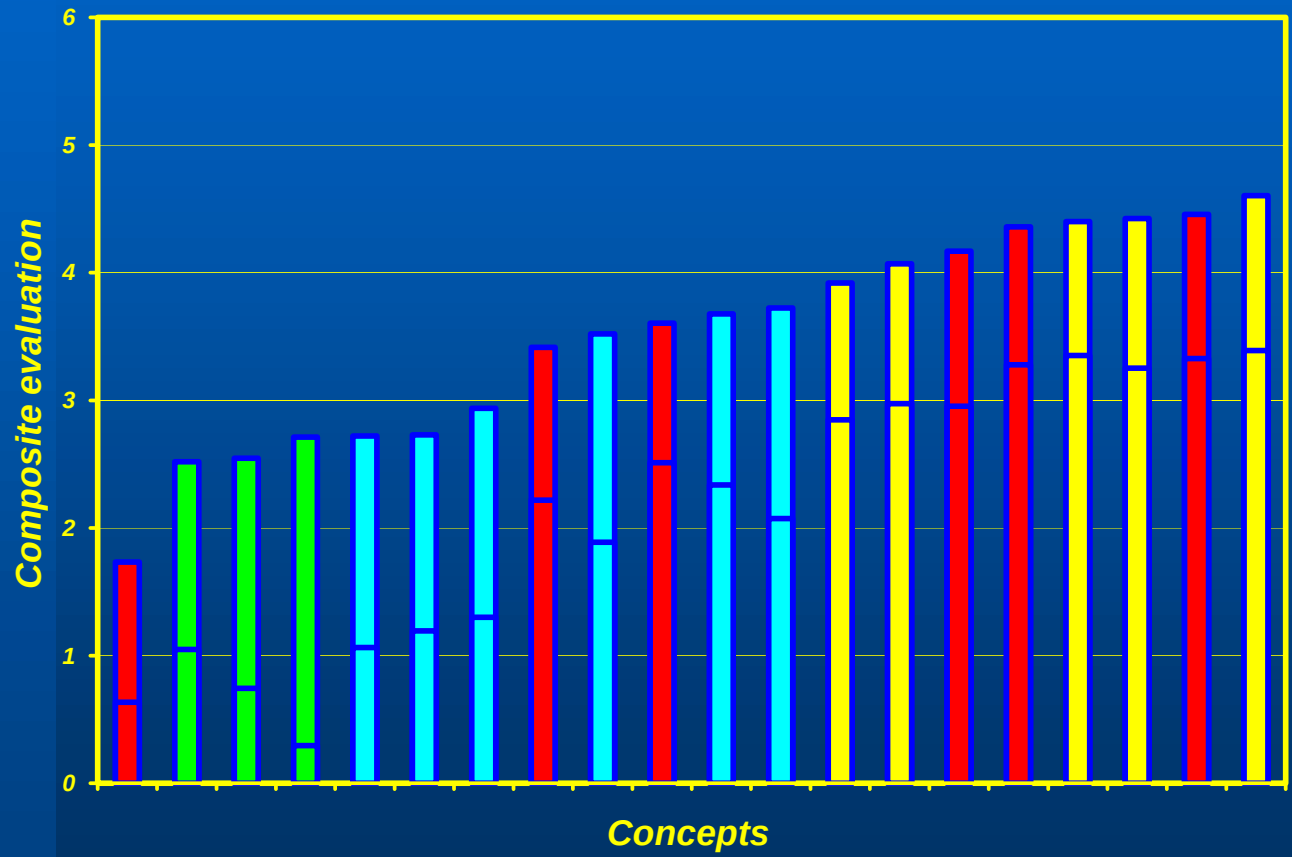
Definition: Composite Score

The sum of the eight goal evaluations, reported at the 75th percentile of the distribution. A perfect score is 8.

Sum of the distributions:

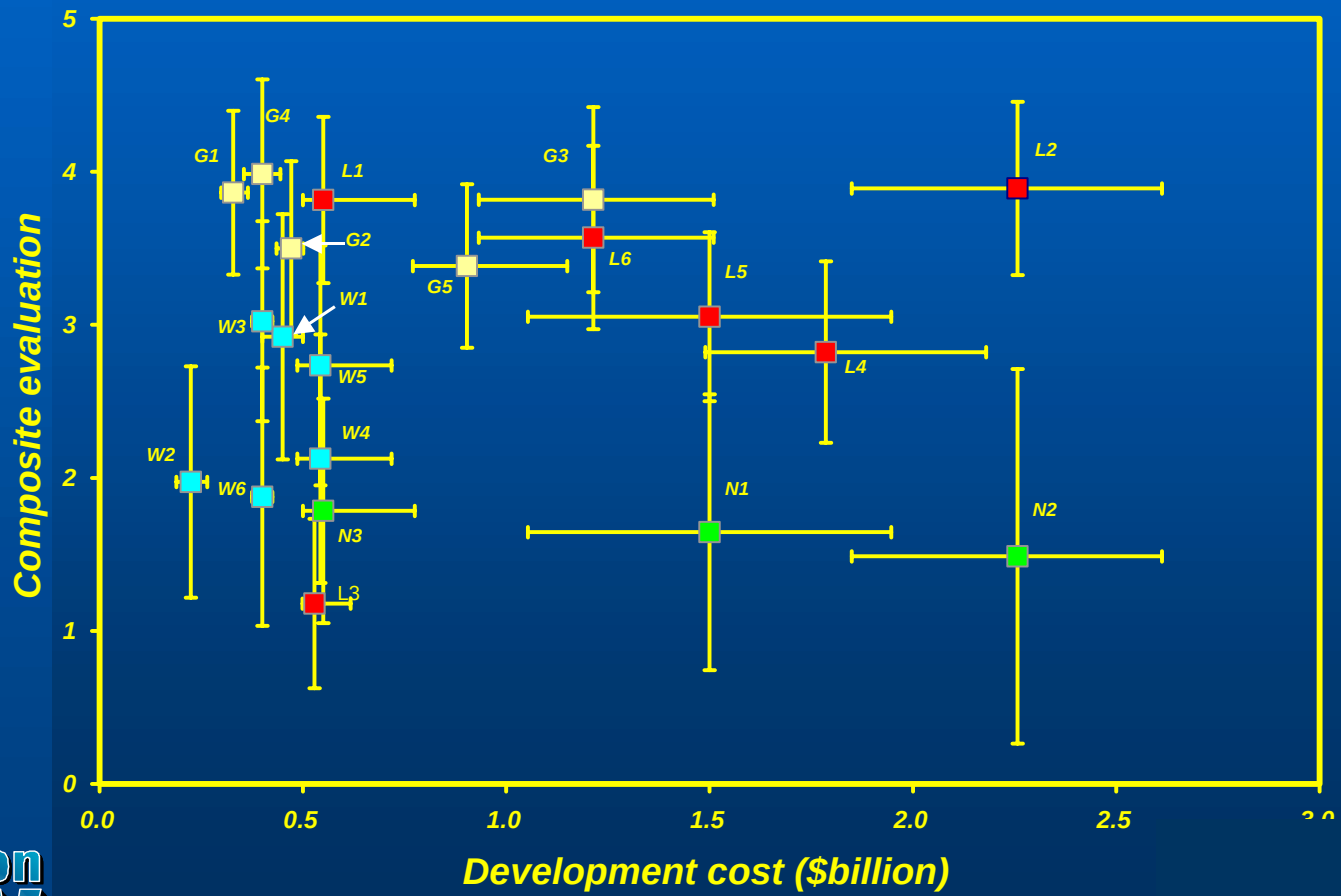


Preliminary Composite Evaluations



Issue: Can further refinement of the evaluations be reasonably expected to differentiate the concepts, given the uncertainties?

Concept Potential and Development Cost



Conclusions on the Evaluations to Date

- *Evaluations to date have been presented with the aim of understanding their general trends.*
- *Through the efforts of the TWGs, the evaluations are progressively being refined and made consistent.*
- *The evaluations of goals and/or goal areas are very useful for informing the process of selection.*
- *Development cost, and R&D Challenge will be useful for informing the process as well.*